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ART. 1. NEW RECORDS OF FRESH-WATER GASTROPODS FROM THE BAHAMA ISLANDS

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In March 1956 Dr. M. Graham Netting and Neil D. Richmond of Carnegie Museum spent two weeks collecting in the Bimini Islands*. Incidental to their other work they made a small but interesting collection of fresh-water snails. This collection contains five species, three of which had not previously been reported from the Bahama Islands. Including these, there are now 11 species of fresh-water snails known to occur in the Bahamas. Although obviously an impoverished fauna it is still remarkable in view of the scarcity and impermanence of bodies of fresh water in these islands.

The following list shows the known distribution of the 11 species:

Littoridina (Littoridinops) tenuipes (Couper). South Bimini, Grand Bahama and Andros islands.

Drepanotrema lucidum (Pfeiffer). Grand Bahama and Cat islands.

Drepanotrema (Fossulorbis) cimex (Moricand). Grand Bahama and Cat islands.

Drepanotrema (Fossulorbis) lanierianus (d'Orbigny). South Bimini (new for Bahamas).

Planorbula albicans (Pfeiffer). Cat Island.

Tropicorbis stagnicola (Moricand). Grand Bahama.

Tropicorbis havanensis (Pfeiffer). Cat Island.

Physella (Physella) cubensis (Pfeiffer). South Bimini, Grand Bahama, Cat, Andros, New Providence, and Eleuthera islands.

Lymnaea cubensis (Pfeiffer). South Bimini (new for Bahamas).

Laevapex bahamensis (Clench). Grand Bahama.

Gundlachia bakeri Pilsbry. South Bimini (new for Bahamas).

With the exception of *Laevapex bahamensis,* all of the other species have a wide distribution in the West Indies, and most of them occur also in the Bermudas, Florida Keys and southern United States. Since the Bahamas were submerged during Pliocene and early Pleistocene, the present fauna is not the result of land connections, but of very new elements which have arrived by accidental means agreeing with what Clench has suggested for the land shell fauna. Glacial control during Pleistocene, lowering the sea-level on the Great Bahamas Bank formed a single or a few larger islands, where proximity with other near-by West Indies favored dispersion.

*During this time they were guests at the Lerner Marine Laboratory through the courtesy of Dr. C. M. Breder, Jr., Chairman and Curator, Department of Fishes and Aquatic Biology of the American Museum of Natural History.

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The Bimini group of islands is on the western side of Great Bahama Bank, on the edge of the Florida Strait. The highest point is about 30 feet above mean tide. The fresh-water shells herewith reported come from a pond on the northeastern corner of South Bimini, near the shore, and surrounded by a mangrove community. An ecological description, reproducing a photograph of this pond, was given by R. A. Howard in 1950 (Ecological Monographs, v. 20, no. 4, p. 334). This body of water is semipermanent and, at the time when the shells were collected, following a very dry season, no water remained except for a wet muddy area in the lowest part of the basin. This wettest part of the pond was covered by a dense stand of cattails (*Typha dominguensis*). All of the shells collected were recovered from a sample of the mud and sand from the bottom. Associated with them were numerous fossil valves of *Glycimeris, Lucina* and other bivalves weathered from the coquina rock that forms the sides and bottom of the pond. The presence of *Glycimeris* (*Tureta*) *arata* (Conrad) suggests that this coquina may be of Pliocene rather than Pleistocene age. *Glycimeris* (*Glycimella*) *decussata* (Linnaeus) is also abundant.

Littoridina (*Littoridinops*) *tenuipes* (Couper)

Amnicola tenuipes Couper, in Haldeman, Monograph of the Limniadae of North America, 1844, pt. 7, p. 23, plate 1, fig. 14-15 and last page of cover.

Bythinella tenuipes, Binney, Land and fresh-water shells of North America, 1865, pt. 3, p. 69.

Hydrobia blacki Pilsbry, Proceedings Academy of Natural Sciences of Philadelphia, 1930, v. 82, p. 301, plate 22, fig. 4-6.

Hydrobia tenuipes, Clench, Memorias Sociedad Cubana de Historia Natural, 1938, v. 12, p. 314.

Littoridina (*Littoridinops*) *tenuipes,* Pilsbry, Nautilus, 1951, v. 66, no. 2, p. 50.

Type locality: Hopeton, Georgia. *Hydrobia blacki* Pilsbry is from Lake Forsyth, Andros Island, and Clench recorded it from Grand Bahama. The species is also well distributed in eastern United States from New York to Florida. This is the first record for South Bimini, where 700 specimens were obtained.

Drepanotrema (*Fossulorbis*) *lanierianus* (d'Orbigny)

Planorbis lanierianus d'Orbigny, Moluscos, in La Sagra, "Historia física, política y natural de la isla de Cuba," 1845, v. 5, p. 104, plate 14, fig. 1-4.

Planorbis sumichrasti Crosse and Fischer, Journal de conchyliologie, 1879, v. 27, p. 342. Crosse and Fischer, Études sur les mollusques terrestres et fluviatiles, in "Recherches zoologiques de l'Amérique Centrale," 1900, pt. 7, p. 69, plate 23, fig. 6-6d.

Drepanotrema (*Fossulorbis*) *sumichrasti,* F. C. Baker, The molluscan family Planorbidae, 1945, p. 118.

Type locality: near Havana, Cuba. For *P. sumichrasti,* Cacoprieto, Tehuantepec, Mexico.

Fourteen adult and young specimens. First record for Bahamas, and not known from other Antilles except Cuba. Our specimens agree very

well with d'Orbigny's figures and description; *D. lanierianus* has been a rather neglected species and F. C. Baker did not mention it in his monograph of 1945. It does not seem to the writer that *sumichrasti* can be separated from *lanierianus*. Other species of *Drepanotrema* in the Bahamas are *D. cimex* (Moricand) and *D. lucidum* (Pfeiffer).

Lymnaea cubensis Pfeiffer

Limnaeus cubensis Pfeiffer, Archiv für Naturgeschichte, 1839, v. 5, p. 354.

Limnaea cubensis, Arango, Contribución a la fauna malacológica cubana, 1879, p. 134.

Limnaea umbilicata C. B. Adams, Contributions to conchology, 1849, p. 45.

Lymnaea lecontii Lea, Proceedings of the Academy of Natural Sciences of Philadelphia, 1864, p. 113.

Galba cubensis, F. C. Baker, Lymnaeidae of North America, 1911, p. 204, plate 27, fig. 9-16.

Lymnaea (Nasonia) cubensis, F. C. Baker, Bulletin of the Wisconsin Geological and Natural History Survey, v. 70, pt. 1, p. 264. Aguayo, Memorias Sociedad Cubana de Historia Natural, v. 12, p. 274, plate 18, fig. 6-9.

Lymnaea cubensis, Vigueras and Moreno, Memorias Sociedad Cubana de Historia Natural, v. 12, p. 74.

A single specimen was obtained in South Bimini which measures 11.5 by 6.5 mm., a little larger than the average size of the species. The type is from Cuba but it is widely distributed from Florida to Texas and northern South America, west to Lower California and most of the Antilles. Not recorded before for the Bahamas. F. C. Baker in 1928 created the subgenus *Nasonia* with this species as the type, but according to Hubendick 1951 (Recent Lymnaeidae, p. 117) the characteristics of the shell, as well as the genitalia, on which this separation was based, are only of specific value.

Physa (Physella) cubensis (Pfeiffer)

Physa cubensis Pfeiffer, Archiv für Naturgeschichte, 1839, v. 1, p. 354.

Physa acuta d'Orbigny, (not Draparnaud 1805; not Sowerby 1840), Moluscos, in La Sagra, "Historia física, política y natural de la isla de Cuba," 1841, v. 1, p. 191.

Physa sowerbyana C. B. Adams, (not *sowerbyana* d'Orbigny 1841), Contributions to conchology, 1849, no. 3, p. 45.

Physa cubensis, Arango, Fauna malacológica cubana, 1879, p. 135.

Physa orbignyi Mazé, Journal de conchyliologie, v. 31, p. 30.

Physa jamaicensis "Mouson," Clessin, Conchylien cabinet, 1885, v. 1, no. 17, p. 291, plate 42, fig. 7 (not *jamaicensis* C. B. Adams).

Physa guadeloupensis "Grateloup," Clessin, Conchylien cabinet, 1885, v. 1, no. 17, p. 291, plate 42, fig. 12.

Physa peninsulae Pilsbry, Nautilus, 1899, v. 13, p. 48.

Physa calaban Vanatta, Proceedings of the Academy of Natural Sciences of Philadelphia, 1910, v. 62, p. 668.

Physa cubensis, Aguayo, Memorias Sociedad Cubana de Historia Natural, v. 21, p. 267, plate 18, fig. 1-3, 1938.

Physa cubensis, Clench, Memorias Sociedad Cubana de Historia Natural, 1936, v. 10, p. 339, plate 25, fig. 2. Bulletin Museum of Comparative Zoology, v. 80, no. 14, p. 517. Revista Sociedad malacológica "Carlos de la Torre," v. 8, p. 103, 1952.

Of 140 specimens, adult and young, the average specimen is 5 by 3 mm., the largest 9 by 5 mm. It is common in all the Antilles and also Florida and northern South America; probably it occurs in all the Bahamas where permanent or semi-permanent bodies of water permit its development. This is the first record for South Bimini. According to Aguayo and Clench, it is a very variable species, but our specimens, except for their sizes, are very uniform.

Gundlachia bakeri Pilsbry (Fig. 1, A-H)

Gundlachia bakeri Pilsbry, Proceedings of the Academy of Natural Sciences of Philadelphia, 1913, v. 65, p. 670, plate 26, fig. 1-3.

Original description: "In the second or septate stage the shell is oblong, the width contained twice in the length; sides slightly convex. The obtuse, rounded summit is very close to the posterior end and overhangs the right margin. Back and left slope are strongly convex; posterior and right slopes short and steep. There are a few low, wave-like concentric wrinkles near the embryonic shell and some faint radial lines on the anterior part. The sides curve into the deck, except posteriorly where there is an angle or keel at junction of upper surface and deck. The deck or septum is convex and covers about two thirds of the lower face. The aperture is oval, its margins elevated, blackish, and a little reflexed. Length 2.8, width 1.4, alt. 1 mm."

The type was obtained in 1911 by Fred Baker in an artificial pond in the city of Pará, Brazil.

The descriptions and dimensions, as well as the figures of *Gundlachia bakeri* agree perfectly with the 12 specimens collected at South Bimini. Most of them represent the septate stage, ranging from 1 to 2.5 mm. long, (Fig. 1, B and E). The complete septate stage is rather tubular inferiorly, with a circular opening (Fig. 1, F). One specimen is of ancyloid form, corresponding to that found by Pilsbry with the type "which may be a dimorphic form, in which the septate stage is omitted". There were no specimens in the type series, according to Pilsbry, of the third or complete *Gundlachia* stage, here called post-septate, but some of the specimens of the Bimini lot represent the initiation of this post-septate stage (Fig. 1, A), and also the full development of this stage (Fig. 1, G and H); this supports Dr. Dall's (1904) opinion that "while retaining the shell of the first year (of a septate stage), an enlarged and somewhat discrepant shell is secreted during the second summer".

A very closely related species is *Gundlachia textilis* (Guppy) from the Island of Trinidad, although it is more than twice as large. The shell of *textilis* when not septate is (after Guppy), of approximate shape between *Uncancylus concentricus* (d'Orbigny) and *Hebetancylus culicoides* (d'Orbigny), but "small specimens are liable to develop a peculiar monstrosity consisting of a plate joining more or less extensively the margin of the aperture". By keeping them alive in aquaria Guppy (1870) found that

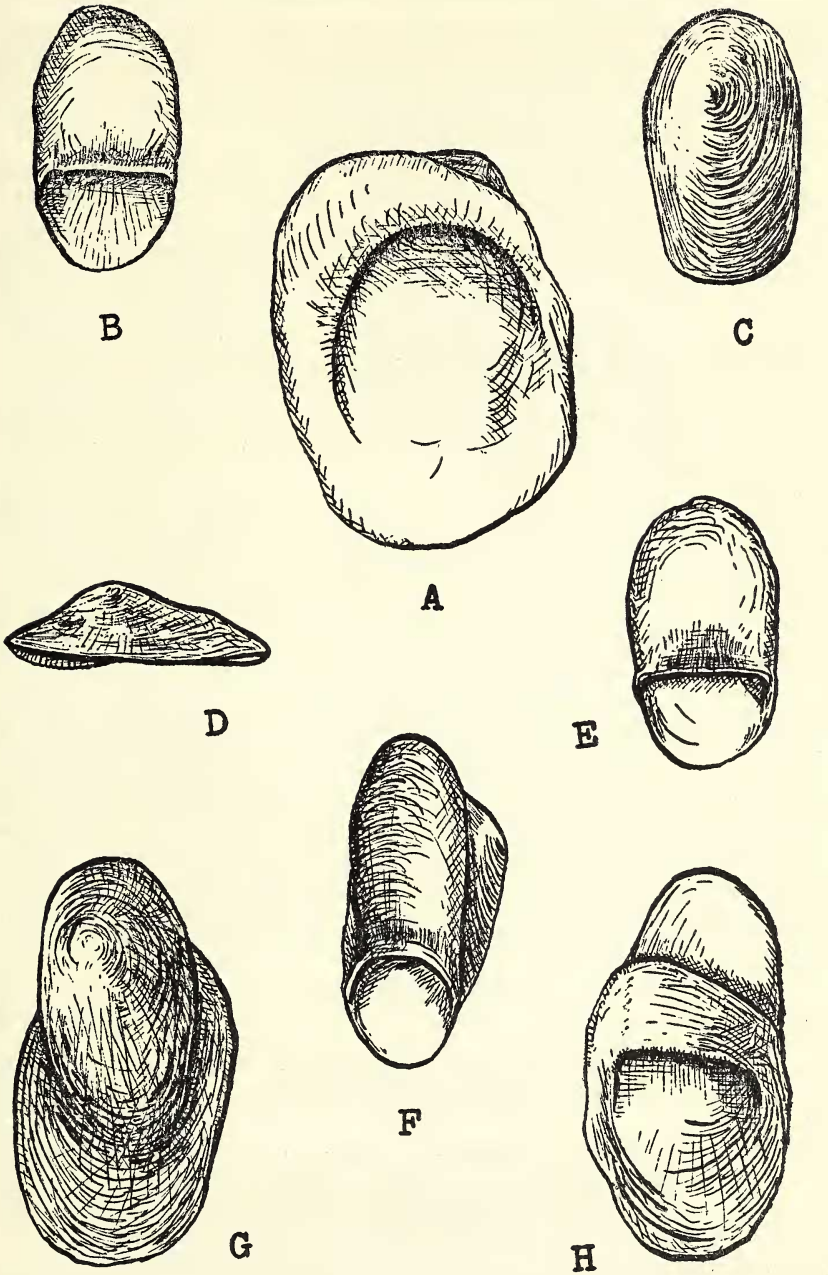

Fig. 1. *Gundlachi bakeri* Pilsbry. A, Initial stage of the post-septate form. B, C, Septate stage, ventral and dorsal view of same specimen. D, E, another septate individual, lateral and dorsal view. F, Complete septate stage. H, G, Dorsal and ventral view of an individual of advanced third, or post-septate stage

septate and non-septate forms develop in the same species. These observations were confirmed by Nordenskjold (1903), and Dall (1904); the former author had the opinion that some *Gundlachia* from the Chaco region in South America are transitional stages in the development of the species known as *Hebetancylus moricandi* (d'Orbigny).

Pilsbry (1913) admitted that *Gundlachia* is dimorphic and sometimes without any septate stage, although different from the true *Ancylus* which never develops a septum; he said, however, that the status of "*Gundlachia* as a genus depends whether we consider as a taxonomic value the ability to produce a septate form" and (1925), "the status of *Hebetancylus* whether it assumes the *Gundlachia* shell form". In the first place, the production of a septum is, indeed, of taxonomic value, but not restricted to *Gundlachia,* being rather a characteristic of the subfamily, because other genera in the *Ferrissinae* are septa producers. In the second case, the recent observations made by Aguayo (1946) and Hylton Scott (1953), proved that *Hebetancylus* are necessarily non-septate forms of *Gundlachia,* and the systematics of the group are still very obscure.

According to Aguayo, *Gundlachia ancyliformis* Pfeiffer, from Havana, has different stages linked with *Hebetancylus havanensis* (Pfeiffer), and Hylton Scott synonymized *Gundlachia nordenskjoldi* Pilsbry with *Hebetancylus moricandi* (d'Orbigny). The last author made careful comparative studies of the anatomy in both supposedly different species, and concluded that the foot, which in ancyloid individuals is elongated, becomes smaller, rounded, and reduced to an anterior position, and the posterior edge of the mantle is expanded forward and finally forms a ring around the foot, with the visceral sac extended dorsally. In such condition the mantle is able to secrete that portion of the shell which corresponds to the septum. As the shells of *Hebetancylus* and *Gundlachia* differ by their, respectively, radially striated and smooth apices, it is inferable that the passing from one stage to another diminishes the taxonomic value of such sculpture. Hannibal (1912) and other authors state that none of the North American *Ferrissia* are known to develop a septum, but I have observed *Gundlachia*-like forms, from Ohio and Indiana with radially striated apices. The taxonomic arrangement of the *Ancylidae* is still very unsatisfactory.

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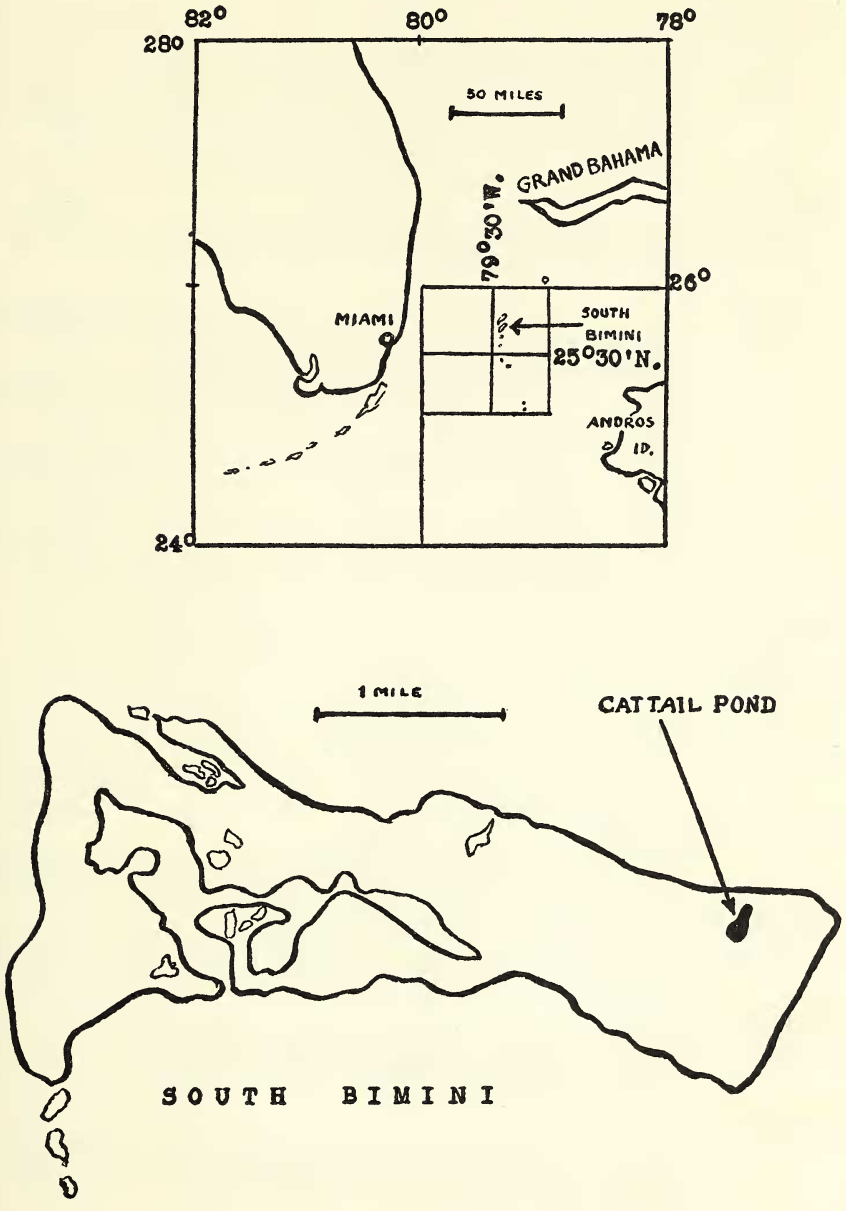

Fig. 2. Location of the South Bimini Island and the Cattail Pond

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